

Comprehensive Nutrient Management Planning

Eleven – Step Guide

Using Animal Manure Efficiently



While Protecting Water Quality

April 2005

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Why Manage Nutrients?

New Mexico farmers and livestock producers are responsible for producing a safe and abundant food supply. They also take pride in being good stewards of land, air, and water resources.

In New Mexico, livestock populations are increasing and becoming more concentrated in certain parts of the State. This concentration poses potential problems for environmentally-sound manure management. Manure runoff and leaching can contaminate ground and surface waters with nitrogen, phosphorus, bacteria, and sediment. Many of New Mexico's water sources are used for human consumption, recreation, and fisheries, as well as irrigation. Improper handling and use of effluent, manure and inorganic fertilizer can impair the quality of these waters and cause human health problems.



The development of the joint United States Department of Agriculture (USDA) and Environmental Protection Agency (EPA) *Unified National Strategy for Animal Feeding Operations* called for large and small livestock producers to address water quality problems, if present, and to improve nutrient management and record-keeping practices. Producers can be proactive and avoid the possibility of regulatory action, fines, and permitting by voluntarily addressing water quality problems.

Where to go for further assistance

Various state and federal agencies, as well as private consultants and industry groups, can help producers address water quality problems and develop nutrient management plans

- New Mexico State University Cooperative Extension
- USDA Natural Resources Conservation Service
- New Mexico Environment Department
- Local Soil and Water Conservation Districts
- NM Dairy Producers, NM Cattlegrowers Association, and other livestock commodity groups

See the government or white pages in your local phone directory or CNMP Fact Sheet for contact information. www.nm.nrcs.usda.gov

This booklet describes successful farm nutrient management practices, and is meant to assist farmers and livestock producers in developing a comprehensive nutrient management plan (CNMP). – the cornerstone of the USDA and EPA *Unified National Strategy for Animal Feeding Operations*.



Comprehensive Nutrient Management Planning

The benefits of manure have long been recognized. However, many farmers may not know the nutrient value of manure produced on their farm, how much is being applied to each field, and whether the application is meeting or exceeding crop nutrient needs. The objective of nutrient management planning is to use both manures and inorganic fertilizers to maximize economic benefits and minimize impacts on the environment.

Comprehensive nutrient management planning addresses all aspects of manure production, collection, storage, and land application, as well as land management practices, record keeping, and other manure utilization options. Managing nutrients efficiently involves developing and maintaining a written comprehensive nutrient management plan (CNMP). According to the *Unified National Strategy for Animal Feeding Operations*, all facilities with more than 1000 animal units are required to develop and implement a CNMP. Facilities with less than 1000 animal units but with unacceptable environmental conditions can also satisfy permitting requirements by developing and implementing a CNMP. Smaller facilities with no environmental concerns are strongly encouraged to develop a CNMP. The recent Farm Bill requires a CNMP on all facilities which receive animal waste management practice cost-share funds.

Comprehensive Nutrient Management and the Three E's

CNMPs incorporate the three E's of stewardship: Economics, Efficiency and Environment.

Economics

The majority of New Mexico farmers raise some type of livestock. It is estimated that more than 15 million tons of manure are produced by these livestock in New Mexico each year.¹ The Nitrogen (N)-Phosphorus (P)-Potassium (K) fertilizer value of this resource exceeds \$ 69 million.¹

Farmers can test manure to determine its nutrient value. Using manure and soil tests together when developing a nutrient management plan can reduce the need for chemical fertilizers. All or most of the needed nutrients can come from manure.



Efficiency

While it may be convenient to apply manure during the winter or on fields near the source area, this is often not an efficient use of nutrients contained in manure. Efficiency means applying manure at the proper rate, time, and in the proper manner so that nutrients can best be utilized for optimum crop yields.

Environment

Manure is a valuable resource. It benefits plant growth by improving soil structure and fertility. However, if manure is handled improperly, water pollution may result. Responsible farmers who manage manure appropriately gain maximum benefits while protecting the environment. This guide describes how nutrient management practices can be integrated into an economical, efficient and environmentally-sound CNMP.

¹ Source: New Mexico Agricultural Statistics and USDA-Natural Resources Conservation Service (NRCS).

As with any farm management program, developing a CNMP requires planning. Planning will help ensure that nutrients and money are not wasted and that ground and surface waters are protected. Below is a summary of the steps involved in comprehensive nutrient management planning.



11 Steps to Comprehensive Nutrient Management Planning

- 1. Assess your operation and identify potential water quality problems and other resource concerns.**
- 2. Evaluate storage requirements.**
- 3. Test soil and manure.**
- 4. Determine manure application rates, methods, and timing.**
- 5. Calibrate application equipment.**
- 6. Incorporate land management practices to reduce leaching and runoff and practices to address other resource concerns.**
- 7. Consider other options for using manure.**
- 8. Identify options for handling livestock mortalities.**
- 9. Consider feed management to reduce nutrient excretion.**
- 10. Keep records and properly operate and maintain structures and practices.**
- 11. Review and update the plan.**



Step 1. Assess your operation.

The first and perhaps most important step in nutrient management planning is to assess your operation and current manure management practices. Throughout the year are there any farm practices that result in discharges to surface or ground water sources?

Some of these practices may be obvious while others may not. When assessing the operation, be honest. Keep in mind that, according to federal law, no manure or contaminated wastewater can be discharged into any surface water sources, including ditches, that leave an operator's property. Similarly, according to New Mexico State law, contaminants cannot be discharged into ground waters such as through a leaking pond or lagoon liner. There is no minimum volume required for a release to be considered a discharge. All run-on, manure and contaminated wastewater from livestock facilities, manure storage sites, and land application areas must be contained.

When assessing the operation consider where manure, wastewater, and runoff go during the year. Rainwater that comes into contact with manure on a feedlot and then runs off into an irrigation ditch may not appear to cause any problems. However, if the ditch leaves the owner's property or connects to any natural stream this may be considered a discharge. Similarly, storing contaminated wastewater in a structure without a proper lining to limit leaching is against the law. Even manure applied on fields can lead to a discharge if rainfall or irrigation runoff leaves the site and enters a surface water body.

Several resources are available to help farmers assess their operations. The New Mexico Farm*A*Syst program includes a series of farm assessment guides and worksheets which lead individuals through a structured evaluation of farm activities and practices. The assessment provides a separate risk rating for individual activities. Recommendations are provided to improve the situation if the risk rating for any activity is high. These as well as other materials on farm assessment and nutrient management are available through your local New Mexico State University Extension or USDA-NRCS office, and on Internet at: <http://www.nm.nrcs.usda.gov>, <http://www.cahe.nmsu.edu/pubs/>, and <http://www.cahe.nmsu.edu/farmasyst/>. Inventory and all forms, software to be used in developing a CNMP are located at <http://www.nm.nrcs.usda.gov/technical/water/nmafo.html>. It may be helpful to have an outside, non-regulatory assessment of your operation. Someone unfamiliar with the day-to-day activities of a facility may be able to identify problems not apparent to the owner or manager. Consider organizing an assessment team made up of local producers with similar interests. Have the team assess each member's facility and discuss recommendations for improvements. Contact local employees of the Soil and Water Conservation District, USDA-NRCS, New Mexico State University (NMSU) Extension, or the appropriate commodity group to obtain additional information on assessing livestock operations.

Step 2. Evaluate storage requirements.

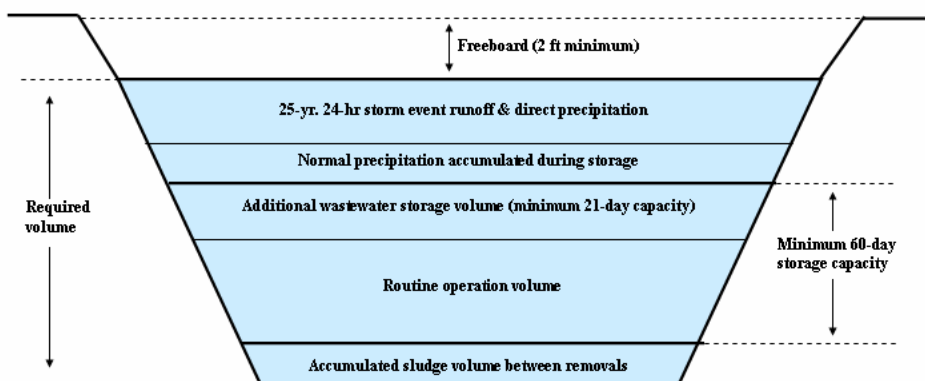
Estimating the volume of manure and wastewater produced is important to determine if storage facilities are adequate.

Wastewater storage facilities must be designed to contain, at minimum, 60 days of maximum daily discharge volume and two foot of additional emergency volume (freeboard). If a waste storage facility is intended to store both storm water runoff and wastewater, the facility must be sized to contain the 60-day wastewater volume, two foot of freeboard, and storm water from a 25 year, 24 hour storm event. In addition to any runoff from a 25 year, 24 hour storm event, direct precipitation, residual solids, and process generated wastewater, waste storage facilities must be designed and operated to maintain additional “freeboard” capable of holding a minimum of 21 days of wastes and process generated wastewater. This additional required volume is intended to be an “emergency” volume for periods such as when the ground is saturated due to recent precipitation, equipment breakage, etc., and it is improper (for agronomic, or other, reasons) or impractical to irrigate the following the normal irrigation schedule. As with rainfall and rainfall runoff volume from the 25-year

rainfall event, this additional freeboard must be restored as soon as possible, but in any event, prior to the next anticipated storm event. If managed properly, the 21-day capacity can be included as part of the 60-day capacity. Figure 1 shows a cross section of the typical volume depths in a storage facility. Waste storage facilities may also



Figure 1. Diagram of Wastewater and Runoff Storage Facility



be designed for total evaporation of all process water. In this case, the facility must be sized to contain all runoff from a 25 year, 24 hour storm event, direct precipitation, residual solids, and process-generated wastewater, with no net gain in stored wastewater volume. The NRCS NM Dairy Pond Sizing Software following the Agricultural Waste Management Field Handbook method for sizing wastewater storage facilities is used in New Mexico (<http://www.nm.nrcs.usda.gov/technical/water/nmafo.html>).



Step 3. Test soil and manure.

Soil testing is essential to determine the current nutrient status of soil and how much supplemental nitrogen, phosphorus, and other nutrients are needed to meet crop needs. Soils should be tested annually when manure applications are made. Soil testing costs less than \$1.00 per acre and can save many times this amount by reducing fertilizer costs.

Collect soil samples annually at a depth of 0 to 6 or 0 to 8 inches for most situations. For corn silage, sample 0-12 inches for all nutrients and 12-24 inches for nitrates. See NMSU Guide A-114 and Guide A-138 for guidelines on soil sampling and interpretation (<http://www.cahe.nmsu.edu/pubs/>). Also, see NRCS New Mexico Agronomy Technical Note 58 for guidance on using the NMSU Soil Test Interpretation Software (<http://www.nm.nrcs.usda.gov/techserv/TechNotes/agro/ag58.xls>). A soil probe is the most efficient way to collect samples. Collect a composite sample by combining a minimum of fifteen samples taken randomly throughout a field in a plastic bucket. Mix the samples, air-dry, and send at least one pint to the lab for analysis. More than one composite may be needed for large or variable fields. The analyses will include pH, electrical conductivity (EC), soil organic matter (OM), nitrate nitrogen (NO₃-N - KCl method), phosphorus (P - Olsen P-test if pH>7),

Manure samples or book values?

Recent research shows that western manure moisture and nitrogen contents are lower, and phosphorus contents higher, than book values. Therefore, use recent manure sample data when possible rather than book values to determine manure application rates.

potassium (K - water extraction method), magnesium (Mg), calcium (Ca), and sodium (Na). Many soils and crops in NM also show a need for sulfur (S), zinc (Zn), manganese (Mn), and other micronutrients. NMED may require additional sampling for your specific permit.

Manure testing is necessary to accurately determine manure nutrient content. Since manure is a variable material, proper procedures must be followed to ensure a representative sample is collected. For liquids, sample directly from the storage structure, from the outlet pipe where liquid is removed, or from the field using cups to catch samples applied through sprinklers. When sampling liquids, collect a minimum of six separate subsamples. Combine the subsamples in a clean bucket, mix well, and transfer approx. one pint of liquid to a clean bottle or other rigid container. Effluent samples should have the pH lowered to preserve the sample. For solids, remove the surface six inch crust and use an auger or shovel to core into the pile. Take a minimum of eight individual subsamples from all sides of the pile and combine them in a clean bucket. Mix well and transfer approximately one quart to a clean plastic bag. Keep all samples cool until they can be transported to a lab. Have these analyzed for total N, P, and K. Your NMED permit will specify the frequency for you to sample liquids and solids.

Step 4. Determine manure application rates, methods and timing.

Conduct a field-specific assessment of the potential for phosphorus transport from the field and for nitrate leaching, using the NM Phosphorus Index and Leaching Index. Calculating the correct rate of manure to apply is important to prevent the buildup of excess nitrogen or phosphorus in soil and the contamination of ground and surface waters. Develop realistic yield goals and select appropriate cropping systems to utilize nutrients efficiently from the soil and from added effluent and manure. Follow NRCS NM Conservation Practice Standard 590 Standard, Specifications, and Job sheet. Determine appropriate application rate for manure and other nutrient sources, using the 590 Job sheet (also known as NMSU Fertilizer Interpretation software - <http://www.nm.nrcs.usda.gov/technical/water/nmafo.html>).



The main factor governing the type of manure application method is moisture content. Select an application method based on the manure storage system and moisture content of manure produced (Table 1). Water is heavy and expensive to haul. Therefore, hauling semi-solid and slurry forms of manure long distances is not desirable. Some form of solid-liquid separation may be advantageous to allow solids to be transported and applied with a box spreader while liquids are applied through an irrigation system or evaporated.

Most solid manure applications are made in spring before planting, or fall after harvest. Wastewater applications can normally be made during the cropping season through an irrigation system. Winter applications of manure should not be made unless measures are taken to ensure

Table 1. Manure forms and application method.

Manure form	% Moisture	Method
Solid	less than 80	Box spreaders
Semi-solid	75-90	Flail spreaders
Slurries	88-98	Tank wagons
Liquid	93-99	Big guns or gated pipe
Ponds/lagoon	96-99	Sprinklers ¹ , big guns, gated pipe, furrow

¹may require screening or chopping.

no field runoff occurs. Waste storage facilities should be empty close to December 1 to ensure necessary storage capacity throughout the winter months. Manure will not be applied on frozen, flooded, or saturated soil and will only be applied to irrigated cropland or hayland. Delay field application of animal manure or other organic by-products if precipitation capable of producing runoff and erosion is forecast within 24 hours of the time of the planned application. Apply only as much pond effluent as can be held in the

planned crop root zone. For example, if the root zone profile can hold four inches of water (Total Water Holding Capacity) and the soil moisture is at 75% TWHC, then the maximum amount of one inch effluent may be applied. Regardless of when or how much manure is applied, additional land management measures may be needed to ensure manure and runoff water do not leave a site after spreading.

Setbacks are required for application of manure, litter and effluent. No application can be made closer than 100 feet to any down gradient sink holes, well heads, or other conduits to surface or ground water. A vegetated buffer (grass, no shrubs) 35 feet wide or more will allow organic application adjacent to the buffer.

Keep field specific records of crops, yields and commercial fertilizer and manure applications (including rates, timing, nutrient content and method of application and incorporation).

Step 5. Calibrate application equipment.

Equipment calibration is necessary to ensure manure and wastewater applications are made at desired rates.

Solid and slurry spreaders

Spreaders discharge at varying rates depending on ground and power takeoff (PTO) speeds, equipment settings, and manure moisture content. To calibrate solid manure spreaders, first load and weigh the contents of the spreader. An alternative method is to weigh a five gallon

bucket of manure and take the weight $\times 1.5 \times \text{length} \times \text{width} \times \text{height}$ of the spreader to estimate tons per load. To calibrate liquid/slurry spreaders, first determine the volume of material in gallons from manufacturer specifications, or by taking the length $\times \text{width} \times \text{height}$ of the spreader $\times 7.5$. For the volume in cylindrical tanks multiply length $\times \text{width} \times \text{height}$ of the spreader $\times 0.8 \times 7.5$. Complete Worksheet 1 by estimating the distance in feet required to spread the entire load.

Distance can be estimated or determined based on known field length or by counting fence posts along the length of the spread and multiplying by the average distance between posts. Also estimate the width of spread in feet, allowing for a 10-20% pass overlap to ensure uniform coverage. Calculate the area

covered and divide by 43,560 to convert to acres. Divide the weight or volume of manure in the spreader by the acres covered to determine the application rate at this setting. If necessary re-adjust settings and calibrate for different rates. Dump truck and spreading with a blade is discouraged.

Sprinkler systems

Design specifications for the sprinkler system may be used to estimate liquid application rates. An alternative method is to place six straight-sided cans at various locations under the sprinkler system.

Measure the depth of liquid in inches accumulated in the cans over a period of time (e.g., 1 hour). Calculate the average depth of liquid in the cans and divide by the time interval to determine application rates in inches per hour. Circles can be estimated by knowing your flow rate in gpm.

Example if the discharge rate is 1000 gpm and the circle is operated for 24 hours and make one pass the calculation would be $1000 \text{ gpm} \times 60 \text{ m/hr} \times 24 \text{ hr/day} = 1,440,000 \text{ gal/day}$. $1,440,000 \text{ gal/day} / 325,851 \text{ gal/ac.ft.} = 4.42 \text{ ac/ft/day}$, then $4.42 \text{ ac/ft/day} \times 12 \text{ ac.in./ac.ft.} = 53 \text{ ac.in./day pumped}$. If this is applied to 125 ac, 53 ac.in./day divided by 125 ac = 0.42 ac.in./ac/day applied.



- Spreader: _____ Date: _____
1. Load weight (tons) or volume (gallons) _____
 2. Distance traveled to spread one load (ft) _____
 3. Width of spread (ft) _____
 4. Area of spread (multiply line 2 by line 3) _____ sq ft
 5. Acres covered (divide line 4 by 43,560) _____ acre
 6. Application rate (tons/acre or 1000 gal/acre)
(divide line 1 by line 5) _____

Notes on settings: _____

Step 6. Incorporate land management practices to reduce leaching and runoff and practices to address other resource concerns.



Minimizing surface runoff and leaching reduces the likelihood that contaminated water from fields will enter a stream or groundwater source. Many land management practices have been proven to reduce leaching and runoff. These practices are referred to as Best Management Practices (BMPs). The following list of BMPs should be adopted on sites where the risk of contaminating surface or ground water is high.

General BMPs:

- Identify fields at high risk for leaching and/or runoff and don't apply manure there or apply at lower rates, and don't apply manure to these fields during winter.
- Consider grazing as an alternative to confinement to reduce the need for manure storage, handling, and spreading.
- Regularly sample manure and soils and calculate manure application rates based on realistic crop yields and procedures described in this brochure.
- Reduce commercial fertilizer rates accordingly when manure is used as a nutrient source.
- Document all land management practices used to prevent surface runoff and leaching. Both photos and written documentation demonstrate awareness and implementation of BMPs.



Specific BMPs to reduce leaching:

- Irrigation water management. Maintain irrigation systems and practice good water management during the growing season, especially on coarse textured soils.
- Don't apply manure, or apply manure at reduced rates (e.g., based on phosphorus), on fields with shallow water tables, coarse textures, or other soil limitations.

Specific BMPs to reduce runoff:

- Berm fields adjacent to surface water sources to contain runoff.
- Use application setbacks and/or vegetated filter strips where manure is applied to fields adjacent to a surface water source.
- Don't apply manure, or apply manure at reduced rates (e.g., based on phosphorus), to steeply sloped fields and/or fields near surface water sources.
- Apply manure to fields with as much vegetative cover as possible or incorporate manure immediately following application.

Specific BMPs for Manure and Runoff Storage:

Manure stockpiles should have the following characteristics:

- Located away from watercourses, above the 100-year flood plain, at least 150 feet downstream of wells
- Runoff diversion around the stockpiles and feeding areas
- Grass filter strips below stockpiles (and around wellheads) to settle solids in runoff from piles
- Soil sampling downhill from stockpiles to monitor a potential nitrate buildup

Runoff storage ponds should have the following characteristics

- Animals fenced out of watercourses and storage pond
- Filter strips or grassed waterways above runoff storage pond to settle solids out
- Seepage should be negligible (lined most of the time)
- Storage pond located at least 150 feet downstream from wells
- Storage pond located in the most impervious soil available



Specific BMPs for Field and Crop Selection:

Apply manure and wastewater to land with the following characteristics:

- Level ground
- Deep water table (50 feet or more)
- Soil with low nitrate and organic matter contents
- Moderate to heavy texture

Do not apply manure or wastewater to:

- Sloping land > 2%
- Frozen ground
- Very sandy soil
- Saturated ground or land with a very shallow water table
- Land within 150 feet of surface water or wells

Apply manure to crops with the following characteristics:

- High nutrient requirements double crop. For Example:
 1. Corn, silage-Winter Wheat, silage
 2. or alfalfa, hay)
- Deep rooted crops
- Whole plant harvested (not just the grain removed)
- High potential yield
- Multiple cuttings

Specific BMPs for Land Application:

Base manure and wastewater application rates upon a site-specific nutrient management plan:

- Use laboratory analyses to determine plant-available nutrients from manure, organic matter, residual soil nutrients
- Calculate manure loading rates using plant-available nitrogen in manure and crop yield goal
- Use management (e.g. handling, application method, tillage, irrigation regime, cropping pattern, grazing pattern) and site factors (soil texture, slope, aspect) to modify manure application rates

Avoid surface runoff:

- Incorporate manure when possible
- Avoid concentrate flow areas (arroyos)

Determine soil type and aquifer contamination potential:

- Coarse-textured soils - apply manure near planting time to minimize nitrate leaching
- Multiple light applications are better than a single, heavy application.
 - Apply manure uniformly with properly-calibrated equipment.
 - Delay fall application until soil temperatures are below 50 F.
 - Create adequate buffer areas around surface water and wells.
 - Maintain grass strips around perimeter of surface water and fields where possible.
 - Apply manure on a rotational basis to fields with high N-use crops (corn, forage, alfalfa etc.)



Other resource concerns, such as odor, dust, and other soil, water, animal, plant, air, or human, must also be addressed in the CNMP as part of a Resource Management System. Several BMPs follow to address odor and dust concerns. The NRCS Field Office Technical Guide, Section IV, Conservation Practices (<http://www.nm.usda.gov>), provides BMPs for addressing all of these concerns.

Specific BMPs for Dust, Fly and Odor Control:

- Harrow pens frequently to expose manure and accelerate drying.
- Scrape pens frequently to remove manure.
- Sprinkle the corrals in dry weather to reduce dust problems.
- Change stocking density, if possible, to control moisture content of the corral surface and reduce odor and dust problems when weather conditions warrant.
- Use windbreaks to reduce dust and odor problems.
- Communicate with neighbors to ensure they understand the dairy operation and are not harboring complaints.

Step 7. Consider other options for using manure.

Some livestock operations may find that they do not have a sufficient land base to utilize all of the manure produced on the farm. Urban encroachment, increasing livestock numbers, or excessive phosphorus loading may necessitate the development of other options for using manure. If the land base is not adequate for the manure generated, consider the following options and incorporate them into the CNMP as needed.



Composting is one option for treating manure and converting it into a higher value product. Composted manure can be sold in urban markets, used for livestock bedding, and may be used as a feed source or supplement for certain livestock. Equipment requirements, facility location, increased labor costs, and odors may limit the feasibility of composting. For more information about composting contact your local County Extension Agent or NRCS office, the Compost Education Resources for Western Agriculture on the Internet: <http://csanr.wsu.edu/compost>, <http://tammi.tamu.edu>, or <http://cahe.nmsu.edu/pubs/>.

Agreements with adjacent landowners to use manure can reduce on-farm acreage requirements for manure spreading. If manure is being sold or given away, provide a recent manure test report to the recipient. Also, require that landowners receiving manure apply it according to proper guidelines such as those found in this publication. The amount of liability retained by the livestock owner when manure is sold or given away to another landowner is a gray area. Therefore, document how much manure is sold or given away each year, to whom, and what information and instructions are provided with the manure. In addition, periodically check with landowners receiving manure to ensure it is being used properly.

Other, experimental options such as **power generation** and **aquatic plant or fish production** may, in the future, become available for using manure. Altering the **manure treatment** system

may also reduce both the quantity and nutrient content of manure, thereby reducing the land base requirement.

Contact your local Extension or NRCS office for more information about options for using manure.

Step 8. Identify options for handling mortalities.

Between one and five percent of animals die on farm each year. These mortalities must be disposed of in a manner acceptable to the producer and according to local, state, and federal regulations. Where available and economical, **rendering** is often the method of choice. Most on-farm mortalities are currently picked up by a rendering service. On-site **burial** was once a common method for mortality disposal and may still be acceptable if mortalities are buried at the proper depth in soils where a water table or other limitation does not exist. **Landfills** may also accept mortalities. **Incineration** is used by larger operations, particularly for smaller animals. Finally, **composting** is a relatively new option for mortality disposal. Check with local county and city officials for any guidelines or regulations regarding burial, landfilling, incineration, or composting of dead animals. A fact sheet on Whole Animal Composting of Dairy Cattle and other related materials are available on the Internet at <http://www.cahe.nmsu.edu/pubs/>.



Step 9. Consider managing feeds to reduce nutrient excretion.

Recent advances in feed formulation, supplementation, and livestock monitoring indicate that feed management can be used to reduce nutrient excretion without reducing animal performance. For example, the milk urea nitrogen test can be used to determine whether dairy cows are being overfed protein in the ration. Recent evidence also suggests that many animals are fed more phosphorus than needed for optimum performance. Phosphorus monitoring in crops and supplements can lead to better dietary phosphorus balancing and reduced phosphorus excretion in the manure. Phytase, an enzyme supplement added to feed of swine and poultry, enhances phosphorus absorption in the



digestive track, thereby reducing phosphorus feeding requirements and excretion in manure. Feed management to reduce nutrient excretion is an emerging field and will likely become a more important management tool in the near future. Contact livestock nutritionists or see <http://www.lpes.org> for info on feed management to reduce nutrient excretion. Feed management is purely a planning consideration of the comprehensive nutrient management plan.

Step 10. Record Keeping and Operation and Maintenance

EXAMPLE RECORD-KEEPING

Schedule of Events:

The following schedule of events is an example of typical recordkeeping to be kept by an animal feeding operation, depending on whether they have a CNMP, CAFO Permit and/or Groundwater Permit. The specific permit may require additional recordkeeping. This is an example and the producer is responsible for compliance with permit requirements. A CNMP for an animal feeding operation must include all recordkeeping requirements for the Groundwater and/or CAFO permit, depending on which permits the operation is required to have. If an operation has both permits, the most frequent recordkeeping must be carried out for the CNMP.

SCHEDULE	FREQUENCY	FORM	REQUIRED FOR
Precipitation	As-Needed	Precipitation Log	CAFO Permit
Wastewater Application	As-Needed	Nutrient Management Records Jobsheet/LADS	CAFO Permit, Groundwater Permit, and CNMP
Manure and Chemical Fertilizer Application	As-Needed	Nutrient Management Records Jobsheet/LADS/Nutrient Application Equipment Calibration	CAFO Permit, Groundwater Permit and CNMP
Off-site Manure Removal	As-Needed	Waste Utilization Jobsheet	CAFO Permit, Groundwater Permit, CNMP
Discharge Report	As-Needed	Discharge Report	CAFO Permit, Groundwater Permit
Spills	As-Needed	Spills Log	CAFO Permit, Groundwater Permit, CNMP
Log of Liner Disturbance	As-Needed	Liner Maintenance Log	CAFO Permit, Groundwater Permit, CNMP
Pond Water Levels	Weekly and As-Needed	Pond Water Levels Log	CAFO Permit, CNMP
Structural Controls Inspection	Quarterly, Weekly, Daily-CAFO Permit Monthly Groundwater Permit	Inspection Report (Structural)	CAFO Permit, CNMP

SCHEDULE	FREQUENCY	FORM	REQUIRED FOR
Soil Analysis	Yearly or more frequently if required	Soil Sampling Form and Lab Report	CAFO Permit, Groundwater Permit, CNMP
Manure Analysis	Yearly or more frequently if required	Manure Analysis Form and Lab Report	CAFO Permit
Wastewater Analysis	Quarterly or as required	Wastewater Analysis Form and Lab Report	Groundwater Permit
Nutrient Management Plan	Annually	Nutrient Management 590 Jobsheet	CNMP, Groundwater Permit, CAFO Permit
Preventative Maintenance	As-Needed	Preventative Maintenance Checklist (non-Structural)	CNMP
Site Inspection	Yearly	Annual Inspection Form	CAFO Permit
Status Review	Yearly	Annual Status Review Form	CNMP
Employee Training	Yearly	Employee Training Log	CAFO Permit
Mortalities Management	As-Needed	Inventory Form for Planned Practices	CAFO Permit, NRCS
Environmental Evaluations	As-Needed	ENV-1 Form or equivalent	CNMP, CAFO Permit
Feed Management	As-Needed	Inventory Form for Planned Practices	CNMP
Soils, Geologic Documentation	When completed	Reports	CNMP, Groundwater Permit
As-built Documentation	When completed	Submit copies to NMED-GWQB and NRCS/Keep	CNMP, Groundwater Permit
Operation and Maintenance	As-Needed	Operation and Maintenance Section of CNMP	CNMP
Monitoring Well Analyses	Quarterly or as required	Lab Reports	Groundwater Permit

Step 11. Review and update the plan.

Developing a comprehensive nutrient management plan (CNMP) is not a one-time process, nor should the CNMP exist and operate separately from the overall farm management plan. As part of the farm management plan, the CNMP must be regularly reviewed and updated as conditions change.

The CNMP must be reviewed and approved by a certified Conservation Planner-CNMP and certified specialists in Manure and Wastewater Handling and Storage, Land Treatment and Nutrient Management. A list of those certified in state can be obtained from NRCS.

The planning process is a cycling process. Once the plan is developed, there may be a need to go back through the entire planning process and revise the plan, if that becomes necessary, as it is being implemented and evaluated. A revision may be necessary because of a change in objectives,

size of the unit, livestock numbers, economics, weather conditions, etc. Based on the results of implementation, there also may be a need to look at additional alternatives if the results of plan implementation are not solving the identified problems or meeting the landowner's/operator's objectives.

Soil Sampling and Nutrient Application rates planned annually, usually before the spring work begins. Here are some final suggestions for developing and implementing a CNMP:

- **Commit** to the planning process. Set aside a large block of time (40 hours or more) to initially develop the CNMP. Winter or other slack times may work well with fewer interruptions.
- Develop the **Plan**. Purchase a large 3-ring binder and use a tab system to organize the CNMP. See NRCS website for animal feeding operations (<http://www.nm.nrcs.usda.gov>) for suggested format for CNMP.
- **Implement** the plan. Refer to the plan regularly as the appropriate farm activities are conducted. Document activities, quantities, yields, soil test information, etc., and file all documentation in the appropriate place in the plan binder.
- **Check** the plan and organize documentation frequently.
- **Review** the CNMP at the end of the year and make necessary modifications in preparation for next year. Set new goals during the review. Also, at this time transfer any older documentation to an archive file such as a metal cabinet for long term storage.
- Include **photographs** where desirable to document improvements made over time.
- Have someone who is trained to do the work plan it if you are unsure how to proceed.



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